

per gram of oven-dried pulp, wherein said first hydrolytic enzyme comprises a cellulose-binding domain free endo-glucanase; and

further treating said hardwood fibers with a cross-linking agent that forms a bond with said aldehyde groups on the surface of said hardwood fibers.

83  
96. A method as defined in claim 95, wherein the dosage of said first hydrolytic enzyme is from about 0.1 to about 5 s.e.u. per gram of oven-dried pulp.

84  
97. A method as defined in claim 95, wherein the dosage of said first hydrolytic enzyme is from about 0.1 to about 2 s.e.u. per gram of oven-dried pulp.

85  
98. A method as defined in claim 95, wherein said first layer defines an outer surface of the paper web.

86  
99. A method as defined in claim 95, wherein said first layer also contains softwood fibers.

87  
100. A method as defined in claim 95, wherein said cross-linking agent is a starch.

88  
101. A method as defined in claim 100, wherein said starch forms a glycosidic bond with said aldehyde groups.

89  
102. A method as defined in claim 100, wherein said starch is a natural starch.

90  
103. A method as defined in claim 95, wherein said paper web includes a second layer formed primarily of pulp fibers selected from the group consisting of softwood fibers, hardwood fibers, and combinations thereof.

91  
104. A method as defined in claim 103, wherein said pulp fibers of said second layer are treated with a second hydrolytic enzyme capable of hydrolyzing said pulp fibers to form aldehyde groups predominantly on the surface of said pulp fibers.

<sup>92</sup>  
~~105~~. A method as defined in claim 104, wherein said second layer contains softwood fibers.

<sup>93</sup>  
~~106~~. A method as defined in claim 104, wherein said second layer contains hardwood fibers.

<sup>94</sup>  
~~107~~. A method as defined in claim 104, wherein said second hydrolytic enzyme comprises a cellulose-binding domain free endo-glucanase.

<sup>95</sup>  
~~108~~. A method as defined in claim 95, wherein a debonder is incorporated into said first layer.

<sup>96</sup>  
~~109~~. A method as defined in claim 95, wherein a strength agent is incorporated into said first layer.

<sup>97</sup>  
~~110~~. A method as defined in claim 95, wherein said first hydrolytic enzyme is a single-component enzyme.

<sup>98</sup>  
~~111~~. A method as defined in claim 95, wherein said first hydrolytic enzyme is a multi-component enzyme.

<sup>99</sup>  
~~112~~. A method for forming a paper web that contains a first layer and a second layer, said method comprising:

providing a first fibrous furnish containing hardwood fibers;

providing a second fibrous furnish containing pulp fibers selected from the group consisting of hardwood fibers, softwood fibers, and combinations thereof;

treating said first fibrous furnish with a cellulosic-binding domain free endo-glucanase to hydrolyze said hardwood fibers and form aldehyde groups predominantly on the surface thereof, wherein the dosage of said cellulosic-binding domain free endo-glucanase is from about 0.1 to about 10 s.e.u. per gram of oven-dried pulp;

further treating said first fibrous furnish with a cross-linking agent that forms a bond with said aldehyde groups on the surface of said hardwood fibers; and

forming the paper web from said first fibrous furnish and said second fibrous furnish, said first fibrous furnish forming said first layer and said second fibrous furnish forming said second layer.

<sup>100</sup>  
~~113~~. A method as defined in claim 112, wherein the dosage of said cellulosic-binding domain free endo-glucanase is from about 0.1 to about 5 s.e.u. per gram of oven-dried pulp.

<sup>101</sup>  
~~114~~. A method as defined in claim 112, wherein the dosage of said cellulosic-binding domain free endo-glucanase is from about 0.1 to about 2 s.e.u. per gram of oven-dried pulp.

<sup>102</sup>  
~~115~~. A method as defined in claim 112, wherein said first fibrous furnish also contains softwood fibers.

<sup>103</sup>  
~~116~~. A method as defined in claim 112, wherein said cross-linking agent is a starch.

<sup>104</sup>  
~~117~~. A method as defined in claim 116, wherein said starch forms a glycosidic bond with said aldehyde groups.

<sup>105</sup>  
~~118~~. A method as defined in claim 116, wherein said starch is a natural starch.

<sup>106</sup>  
~~119~~. A method as defined in claim 112, wherein said cross-linking agent is applied in an amount from about 1 to about 15 pounds per metric ton of the weight of the first fibrous furnish.

<sup>107</sup>  
~~120~~. A method as defined in claim 112, wherein said cross-linking agent is applied in an amount from about 1 to about 10 pounds per metric ton of the weight of the first fibrous furnish.

<sup>108</sup>  
~~121~~. A method as defined in claim 112, wherein a debonder is applied to said first fibrous furnish.

<sup>109</sup>  
~~122~~. A method as defined in claim 112, wherein a strength agent is applied to said first fibrous furnish.

<sup>110</sup>  
~~123~~. A method as defined in claim 112, wherein said second fibrous furnish is treated with a cellulosic-binding domain free endo-glucanase capable of hydrolyzing said pulp fibers to form aldehyde groups predominantly on the surface of said pulp fibers.

<sup>111</sup>  
~~124~~. A method as defined in claim 123, wherein said second fibrous furnish contains softwood fibers.

<sup>112</sup>  
~~125~~. A method as defined in claim 123, wherein said second fibrous furnish contains hardwood fibers.

<sup>113</sup>  
~~126~~. A method for forming a paper web that contains a first layer formed primarily from hardwood fibers, said first layer defining an outer surface of the paper web, said method comprising:

treating said hardwood fibers with a cellulosic-binding domain free endo-glucanase to hydrolyze said hardwood fibers and form aldehyde groups predominantly on the surface thereof, wherein the dosage of said cellulosic-binding domain free endo-glucanase is from about 0.1 to about 5 s.e.u. per gram of oven-dried pulp; and

further treating said hardwood fibers with a starch cross-linking agent that forms a glycosidic bond with said aldehyde groups on the surface of said hardwood fibers.

<sup>114</sup>  
~~127~~. A method as defined in claim 126, wherein the dosage of said cellulosic-binding domain free endo-glucanase is from about 0.1 to about 2 s.e.u. per gram of oven-dried pulp.

<sup>115</sup>  
~~128~~. A method as defined in claim 126, wherein said first layer also contains softwood fibers.

<sup>116</sup>  
~~129~~. A method as defined in claim 126, wherein said starch is a natural starch.

<sup>117</sup>  
~~130~~. A method as defined in claim 126, wherein said paper web includes a second layer formed primarily of pulp fibers selected from the group consisting of softwood fibers, hardwood fibers, and combinations thereof.

<sup>118</sup>  
~~131~~. A method as defined in claim 130, wherein said pulp fibers of said second layer are treated with a cellulosic-binding domain free endo-glucanase capable of hydrolyzing said pulp fibers to form aldehyde groups predominantly on the surface of said pulp fibers.

<sup>119</sup>  
~~132~~. A method as defined in claim 131, wherein said second layer contains softwood fibers.

<sup>120</sup>  
~~133~~. A method as defined in claim 131, wherein said second layer contains hardwood fibers.

<sup>121</sup>  
~~134~~. A method as defined in claim 126, wherein a debonder is incorporated into said first layer.

<sup>122</sup>  
~~135~~. A method as defined in claim 126, wherein a strength agent is incorporated into said first layer.